On page 69, line 15, following "control and data over Ethernet", please delete "32" and insert therefor - - 41 - -.

In the Drawings

Please amend Figures 9b, 16c, 17, 18, 19, 20, 23, 26, 35, and 55 as shown in red in the attached drawings.

REMARKS

Applicants respectfully request that the Examiner enter the amendments set forth above prior to examining the above-referenced application.

Applicant amend the specification and Figures 9b, 16c, 17, 18, 19, 20, 23, 26, 35, and 55 to correct typographical errors. Specifically, reference numeral 32 is a duplicate. Therefore Applicants replace reference numeral 32 with reference numeral 41 in both the specification and Figures 9b, 16c, 17, 18, 19, 20, 23, and 26. Applicants add reference numeral 41 to the connection between NMS 60 and the network device 540 in Figure 35. Reference numeral 838 is added to the input marked "Alt. Input from other EX CTS" in Figure 55. Both reference numeral 41 and reference numeral 838 are referred to in the specification and used in other figures to designate the same part of the invention. No new matter is added by these amendments.

In addition, Applicants amend Figure 55 to remove an extraneous line section to indicate the correct connection of the *output* 770 to the Alt. *output* to other EX CTS. Support for this amendment can be found throughout the specification, for example, on page 193, lines 14-17. In particular, the specification recites that "the output 770 (marked "Alt. Output to other EX CTS") of timing module 76 may be provided to the other EX CTS and received as

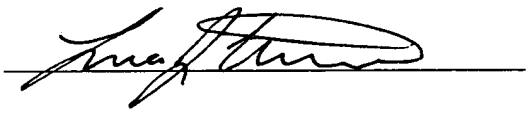
input 838 (marked "Alt. Input from other EX CTS"). Thus, no new matter is added by this amendment.

For the Examiner's convenience, Applicants enclose a copy of pages 68 and 69 of the specification in which the above corrections are indicated in red.

The Examiner is urged to telephone the undersigned Attorney for Applicant in the event that such communication is deemed to expedite prosecution of this matter.

Respectfully submitted,

Date: 12/18/00



Lisa J. Michaud
Reg. No. 44,238
Attorney for Applicant(s)

Nutter, McClennen & Fish, LLP
One International Place
Boston, MA 02110-2699
Tel: (617)439-2550
Fax: (617)310-9550

corresponding to the particular devices on each card. Referring to Fig. 8, slave MCDs 39a-39n search PMD file 48 in memory 40 on central processor 12 for a match with their line card type and version number. Just as the master MCD 36 found the name of the MKI executable file for each line card in the PMD file, each slave MCD 39a-39n reads the PMD file to learn the names of all the device driver executable files associated with each line card type and version. The slave MCDs provide these names to the slave SRMs on their boards. Slave SRMs 37a-37n then download and execute the device driver executable files (DD.exe) 56a-56n from memory 40. As one example, one port device driver 43a-43d may be started for each port 44a-44d on line card 16a. The port driver and port are linked together through the assigned port PID number.

In order to understand the significance of the PMD file (i.e., metadata), note that the MCD software does not have knowledge of board types built into it. Instead, the MCD parameterizes its operations on a particular board by looking up the card type and version number in the PMD file and acting accordingly. Consequently, the MCD software does not need to be modified, rebuilt, tested and distributed with new hardware. The changes required in the software system infrastructure to support new hardware are simpler modify logical model 280 (Fig. 3a) to include: a new entry in the PMD file (or a new PMD file) and, where necessary, new device drivers and applications. Because the MCD software, which resides in the kernel, will not need to be modified, the new applications and device drivers and the new DDL files (reflecting the new PMD file) for the configuration database and NMS database are downloaded and upgraded (as described below) without re-booting the computer system.

Network Management System (NMS):

Referring to Fig. 9a, as described above, a user / network administrator of computer system 10 works with network management system (NMS) software 60 to configure computer system 10. In the embodiment described below, NMS 60 runs on a personal computer or workstation 62 and communicates with central processor 12 over Ethernet network 41 (out-of-band). Instead, the NMS may communicate with central processor 12 over data path 34 (Fig. 1, in-band). Alternatively (or in addition as a back-up

communication port), a user may communicate with computer system 10 through a console interface / terminal (840, Fig. 2a) connected to a serial line 66 connecting to the data or control path using a command line interface (CLI) protocol. Instead, NMS 60 could run directly on computer system 10 provided computer system 10 has an input mechanism for the user.

During installation, an NMS database 61 is established on, for example, work-station 62 using a DDL executable file corresponding to the NMS database. The DDL file may be downloaded from persistent storage 21 in computer system 10 or supplied separately with other NMS programs as part of an NMS installation kit. The NMS database mirrors the configuration database through an active query feature (described below). In one embodiment, the NMS database is an Oracle database from Oracle Corporation in Boston, Massachusetts.

16 The NMS and central processor 12 pass control and data over Ethernet 32 using, for example, the Java Database Connectivity (JDBC) protocol. Use of the JDBC protocol allows the NMS to communicate with the configuration database in the same manner that it communicates with its own internal storage mechanisms, including the NMS database. Changes made to the configuration database are passed to the NMS database to ensure that both databases store the same data. This synchronization process is much more efficient, less error-prone and timely than older methods that require the NMS to periodically poll the network device to determine whether configuration changes have been made. In these systems, NMS polling is unnecessary and wasteful if the configuration has not been changed. Additionally, if a configuration change is made through some other means, for example, a command line interface, and not through the NMS, the NMS will not be updated until the next poll, and if the network device crashes prior to the NMS poll, then the configuration change will be lost. In computer system 10, however, command line interface changes made to configuration database 42 are passed immediately to the NMS database through the active query feature ensuring that the NMS, through both the configuration database and NMS database, is immediately aware of any configuration changes.

FIG. 9b

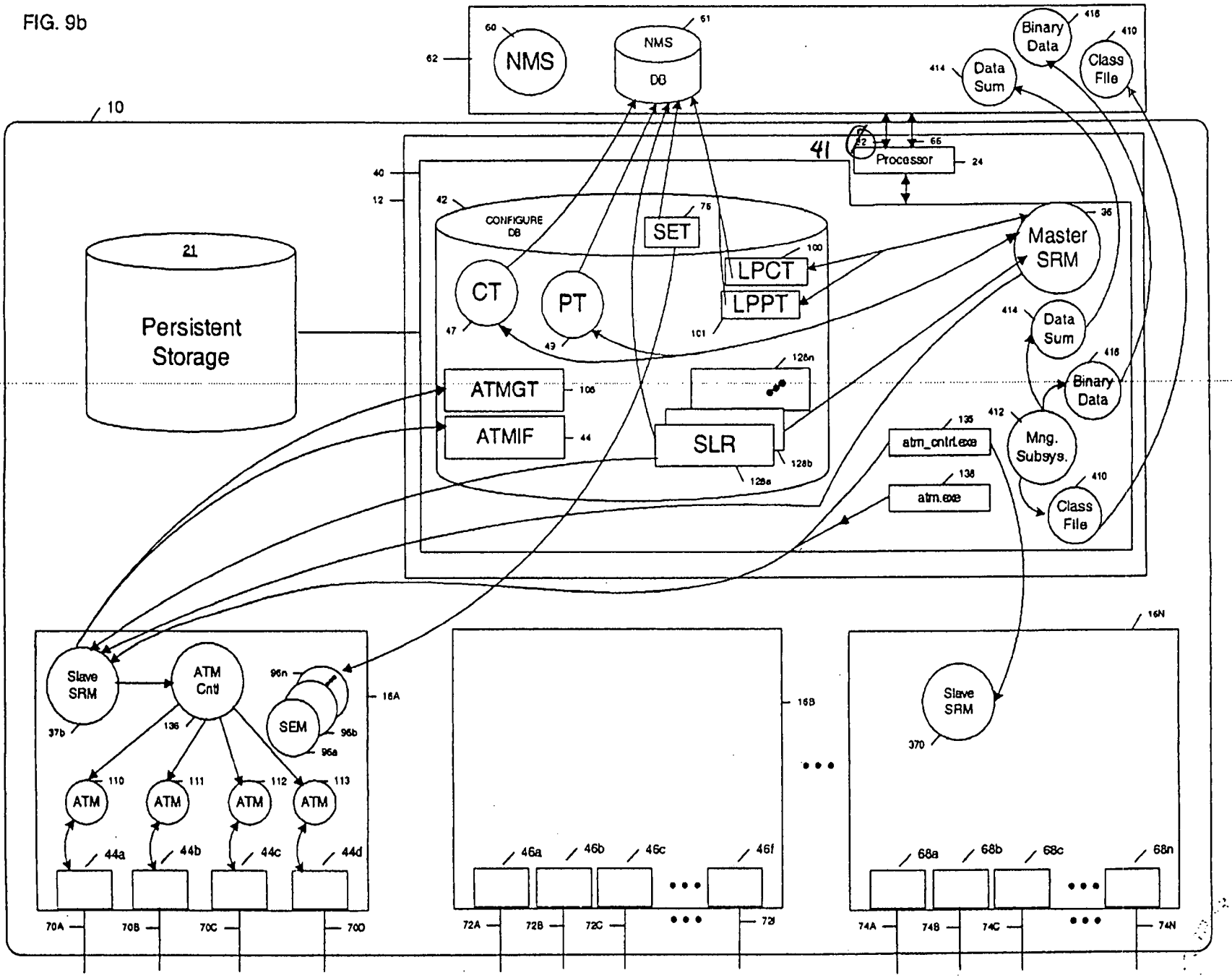

10
NMS
60
62
NMS DB
61
Binary Data
416
Class File
410
Data Sum
414
41
Processor
24
66
40
12
42
CONFIGURE DB
SET
75
LPCT
100
LPPT
101
CT
47
PT
49
Master SRM
36
Data Sum
414
Binary Data
416
Mng. Subsys.
412
Class File
410
21
Persistent Storage
ATMGT
106
ATMIF
44
SLR
128a
128b
128n
atm_cntrl.exe
135
atm.exe
138
Slave SRM
37b
ATM Cntl
136
SEM
96a
96b
96n
16A
ATM
110
111
112
113
44a
44b
44c
44d
70A
70B
70C
70D
16B
46a
46b
46c
46f
72A
72B
72C
72I
16N
Slave SRM
370
68a
68b
68c
68n
74A
74B
74C
74N

FIG. 16c

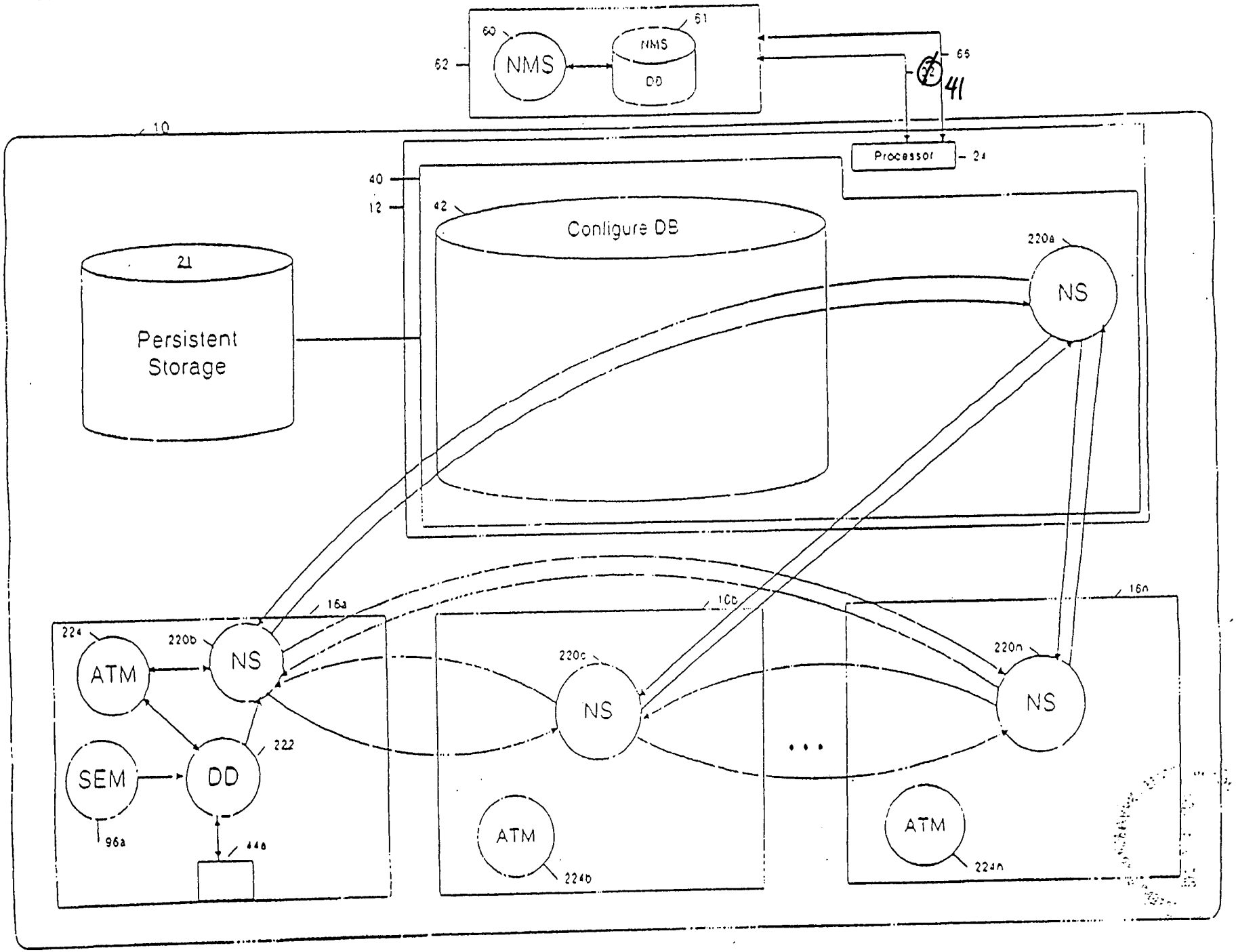

60
NMS
61
NMS
DD
62
66
41
10
Processor
24
40
12
42
Configure DB
21
Persistent Storage
220a
NS
16a
100
16n
224
220b
ATM
NS
220c
NS
220n
NS
222
SEM
DD
96a
44a
ATM
224b
ATM
224n

FIG. 17

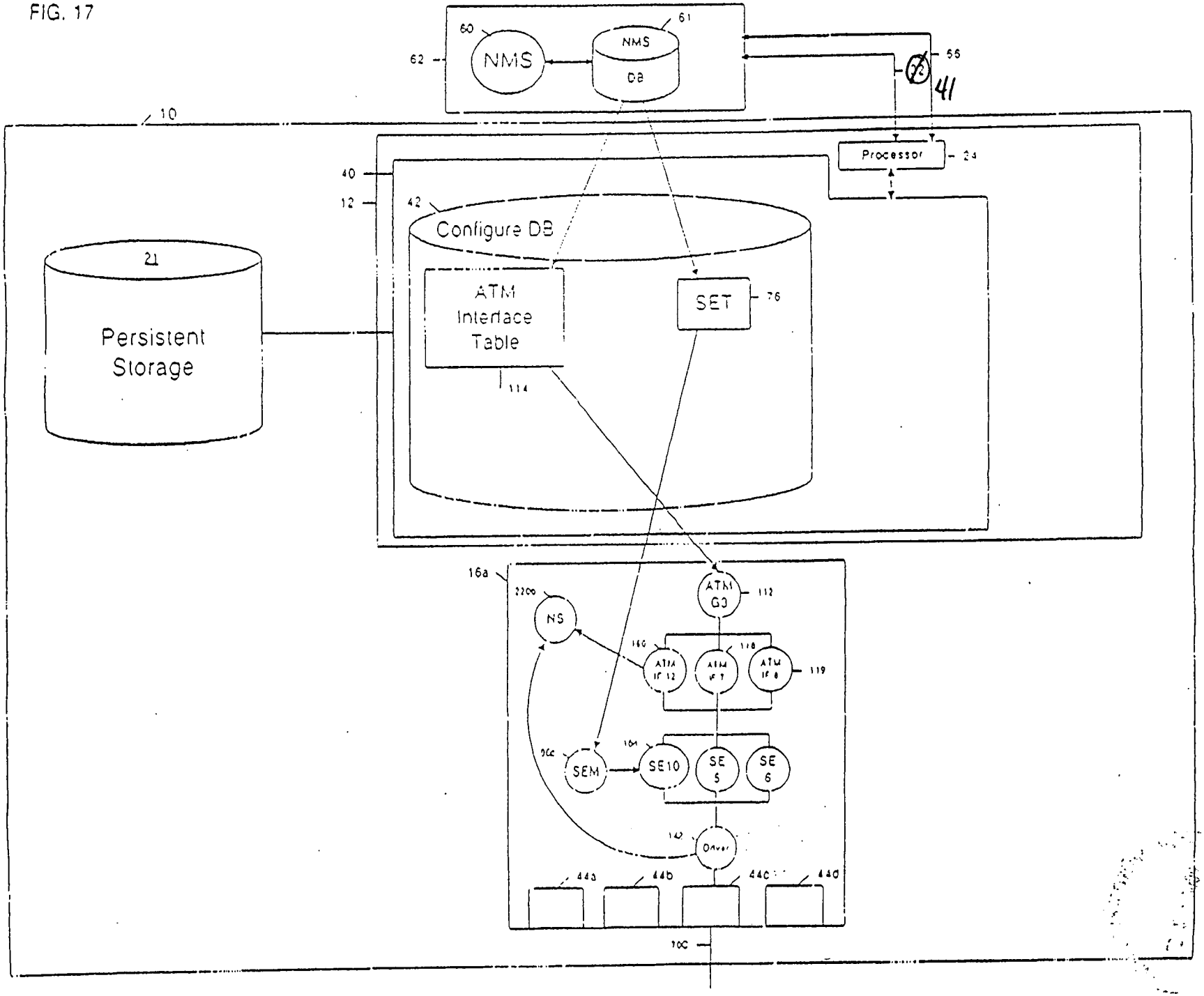

60
NMS
61
NMS
DB
62
55
41
10
Processor
40
12
42
Configure DB
21
Persistent Storage
ATM Interface Table
114
SET
76
16a
ATM GD
112
NS
SEM
SE10
SE 5
SE 6
100

FIG. 18

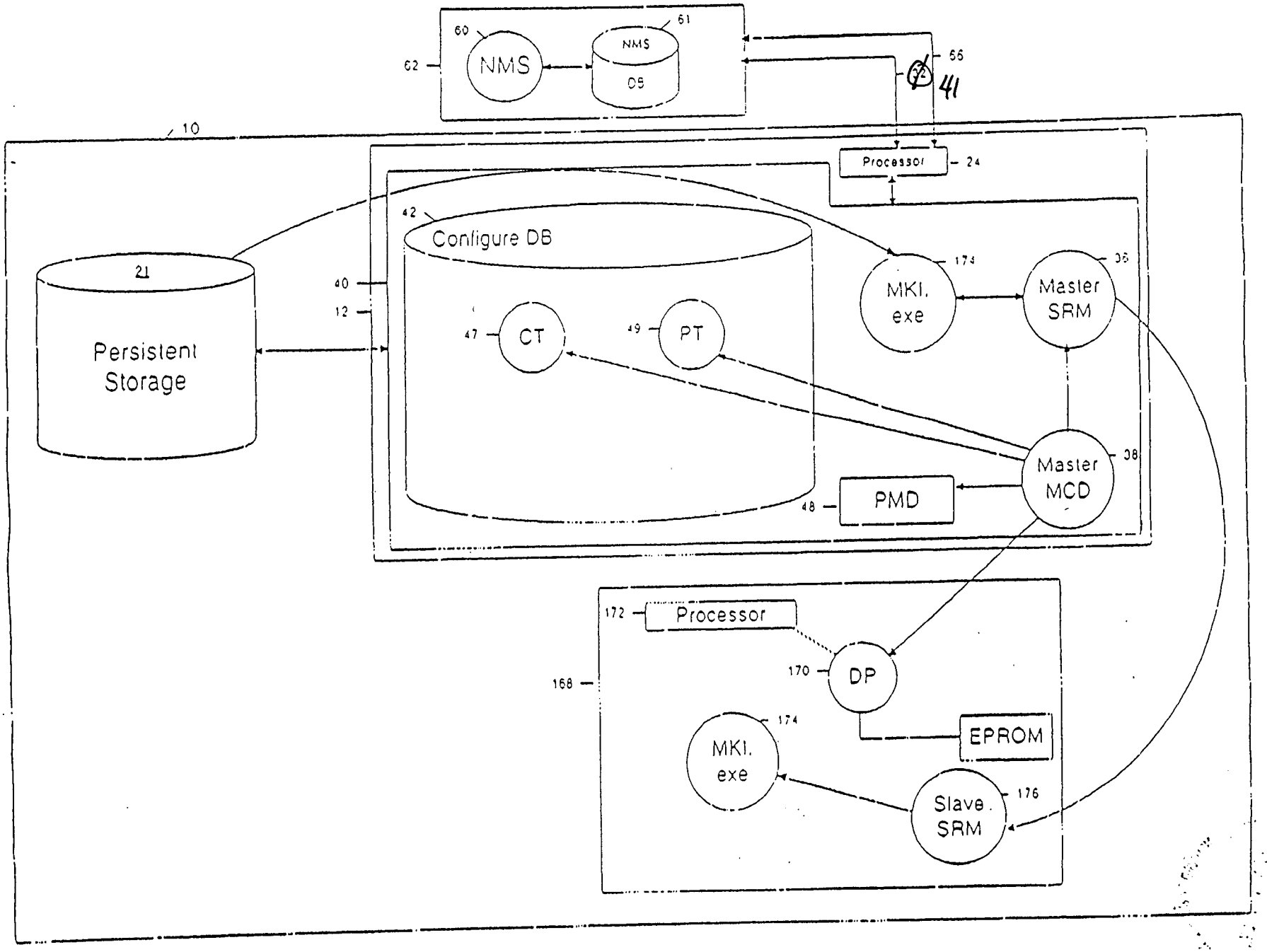

60
NMS
61
NMS
DB
62
55
41
10
Processor
24
42
Configure DB
21
Persistent Storage
40
12
47
CT
49
PT
MKI. exe
174
Master SRM
36
Master MCD
38
PMD
48
172
Processor
170
DP
168
EPROM
MKI. exe
174
Slave SRM
176

FIG. 19

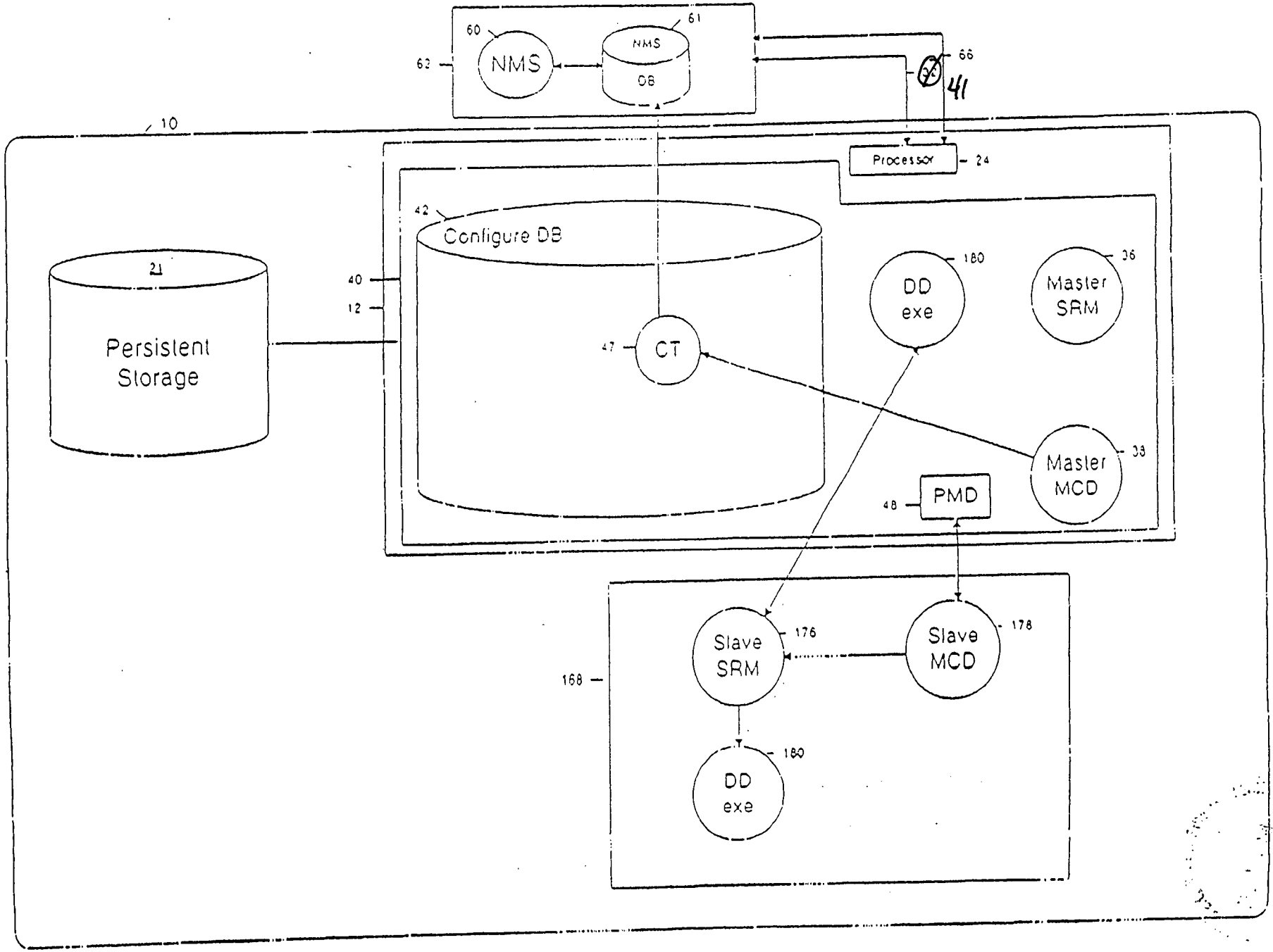

60
NMS
61
NMS
DB
62
66
41
10
Processor
24
42
Configure DB
21
Persistent Storage
40
12
47
CT
180
DD exe
36
Master SRM
38
Master MCD
48
PMD
168
Slave SRM
176
Slave MCD
178
180
DD exe

FIG. 20

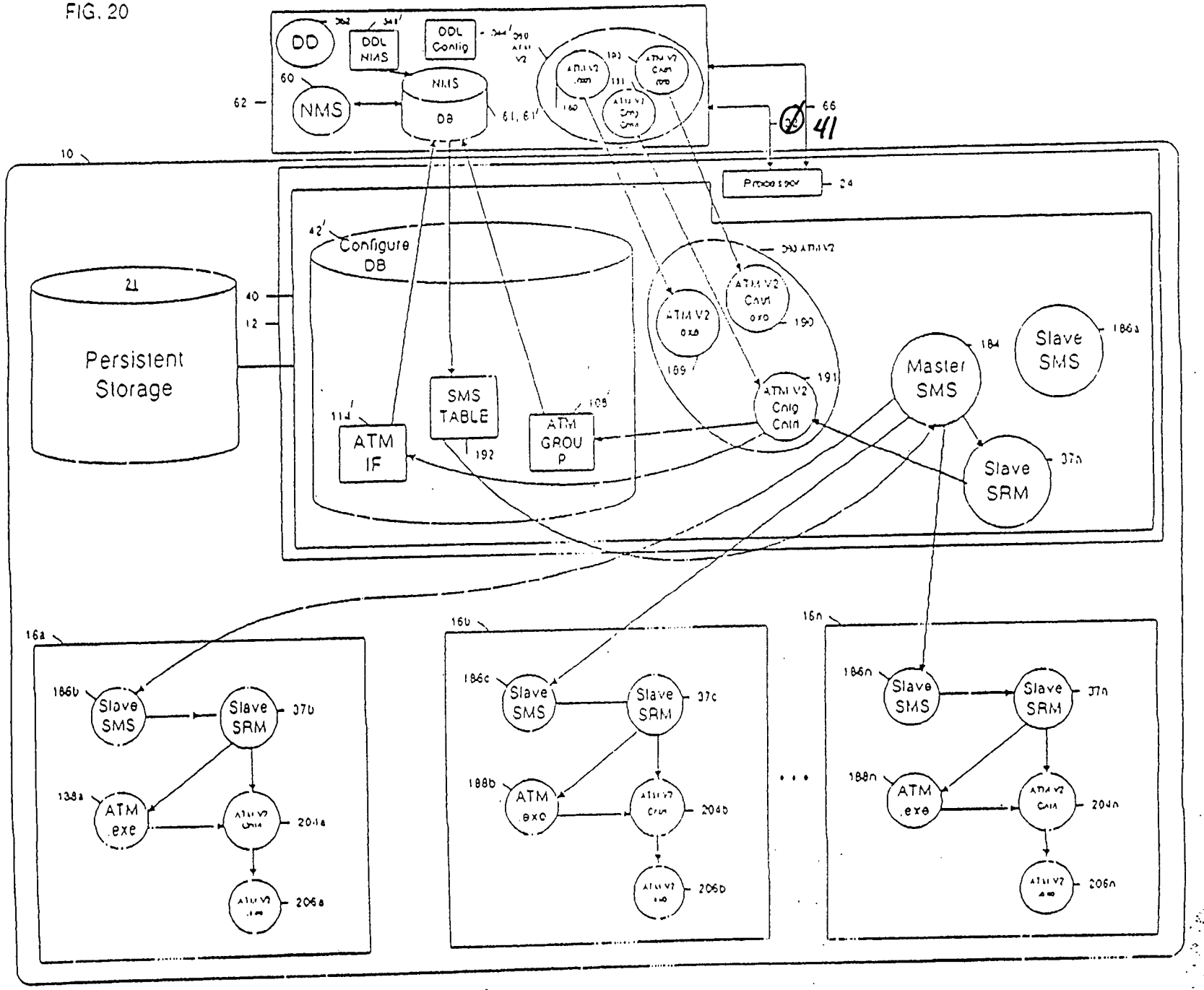

DD
DDL NMS
DDL Config
NMS
NMS DB
60
62
66
41
10
Processor
24
Configure DB
42
Persistent Storage
21
40
12
ATM V2 Config
190
ATM V2 Config
191
ATM IF
SMS TABLE
192
ATM GROUP
Master SMS
184
Slave SMS
186a
Slave SRM
37a
16a
16b
16n
Slave SMS
186b
Slave SRM
37b
ATM .exe
188a
206a
Slave SMS
186c
Slave SRM
37c
ATM .exe
188b
206b
206c
Slave SMS
186n
Slave SRM
37n
ATM .exe
188n
206n

FIG. 23

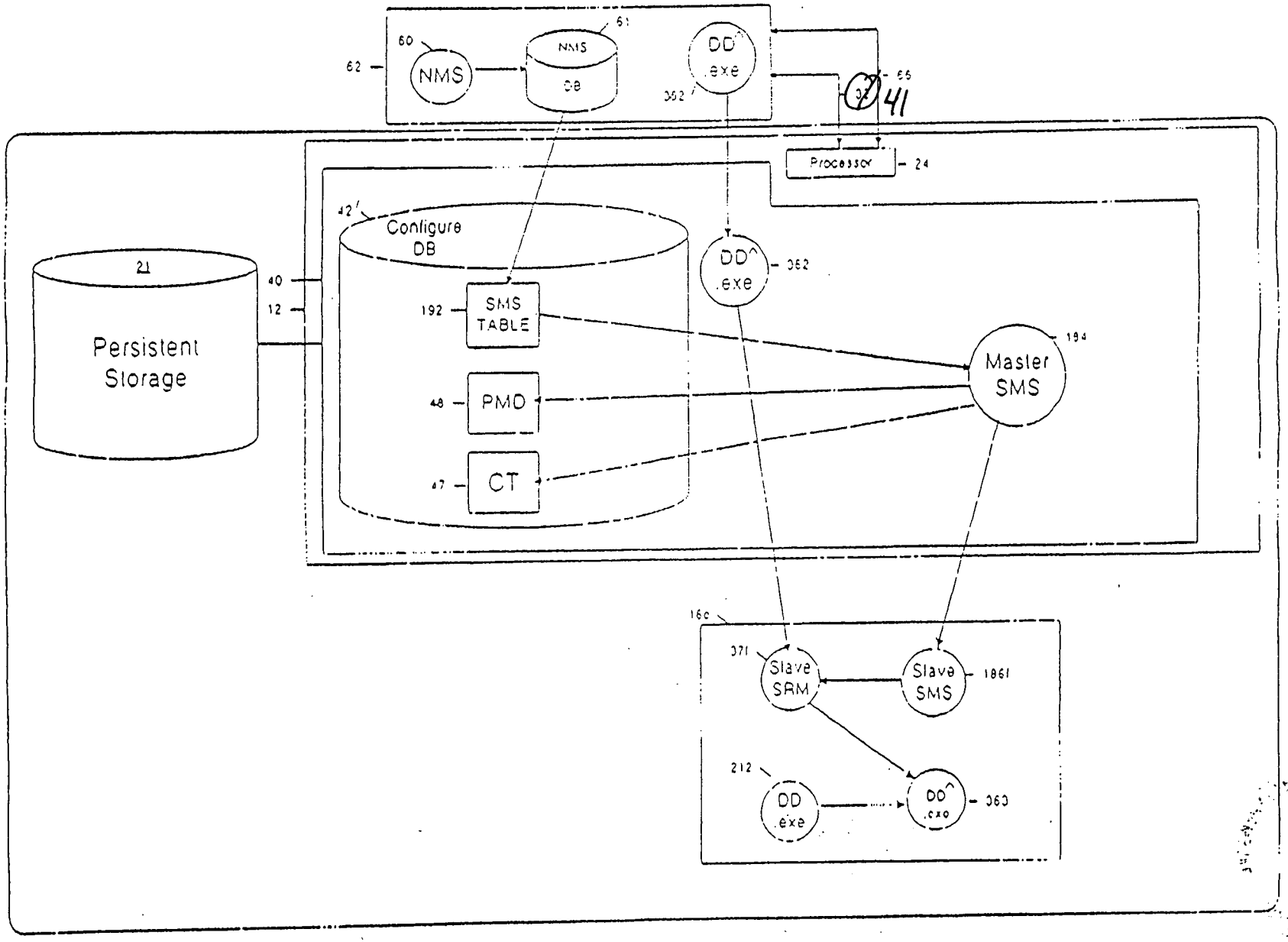

60
NMS
62
NMS
DB
61
DD
.exe
362
66
41
Processor
24
42'
Configure
DB
DD
.exe
362
21
Persistent
Storage
40
12
192
SMS
TABLE
48
PMD
47
CT
Master
SMS
194
16c
371
Slave
SAM
Slave
SMS
1861
212
DD
.exe
DD
.exe
363

FIG. 26

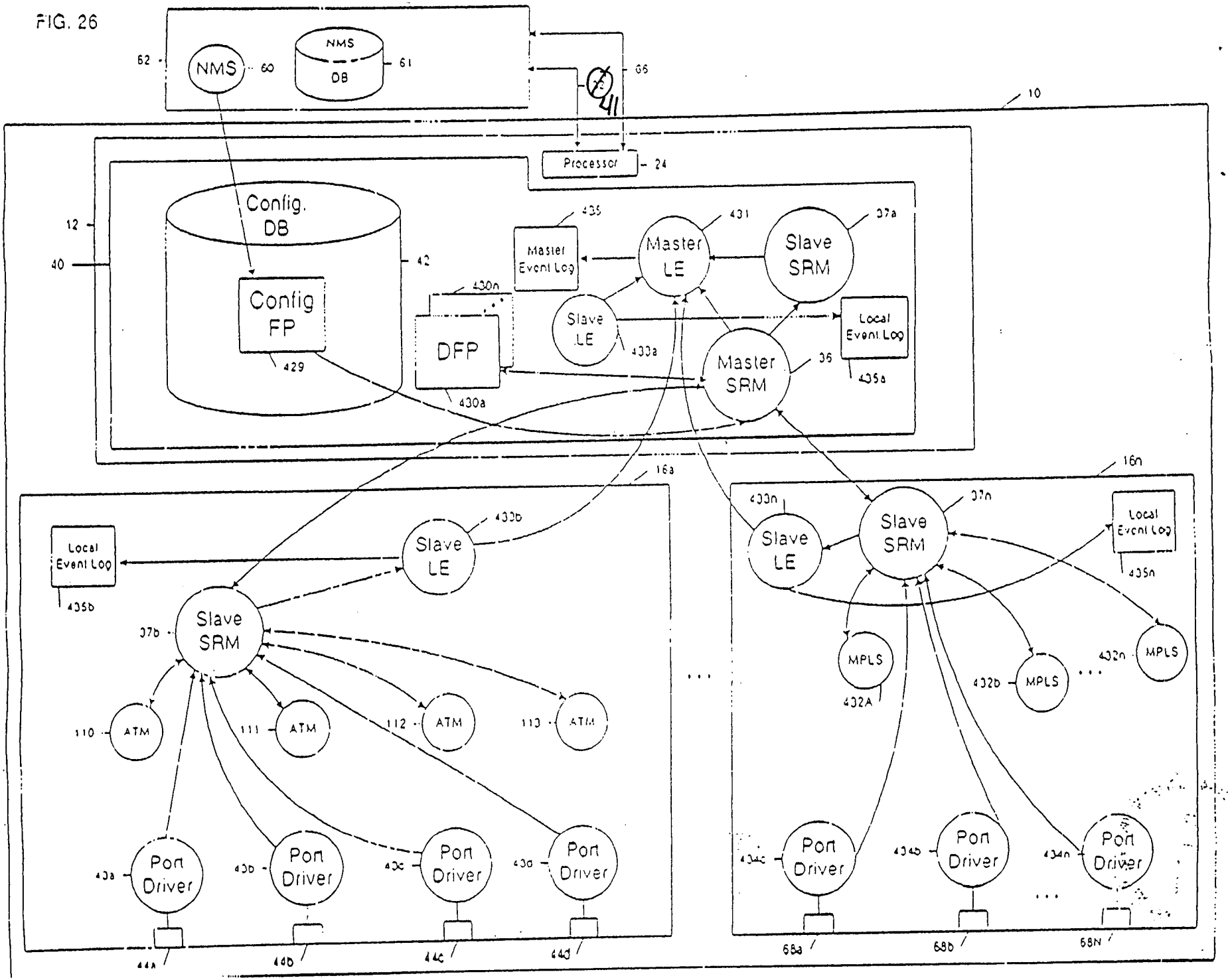
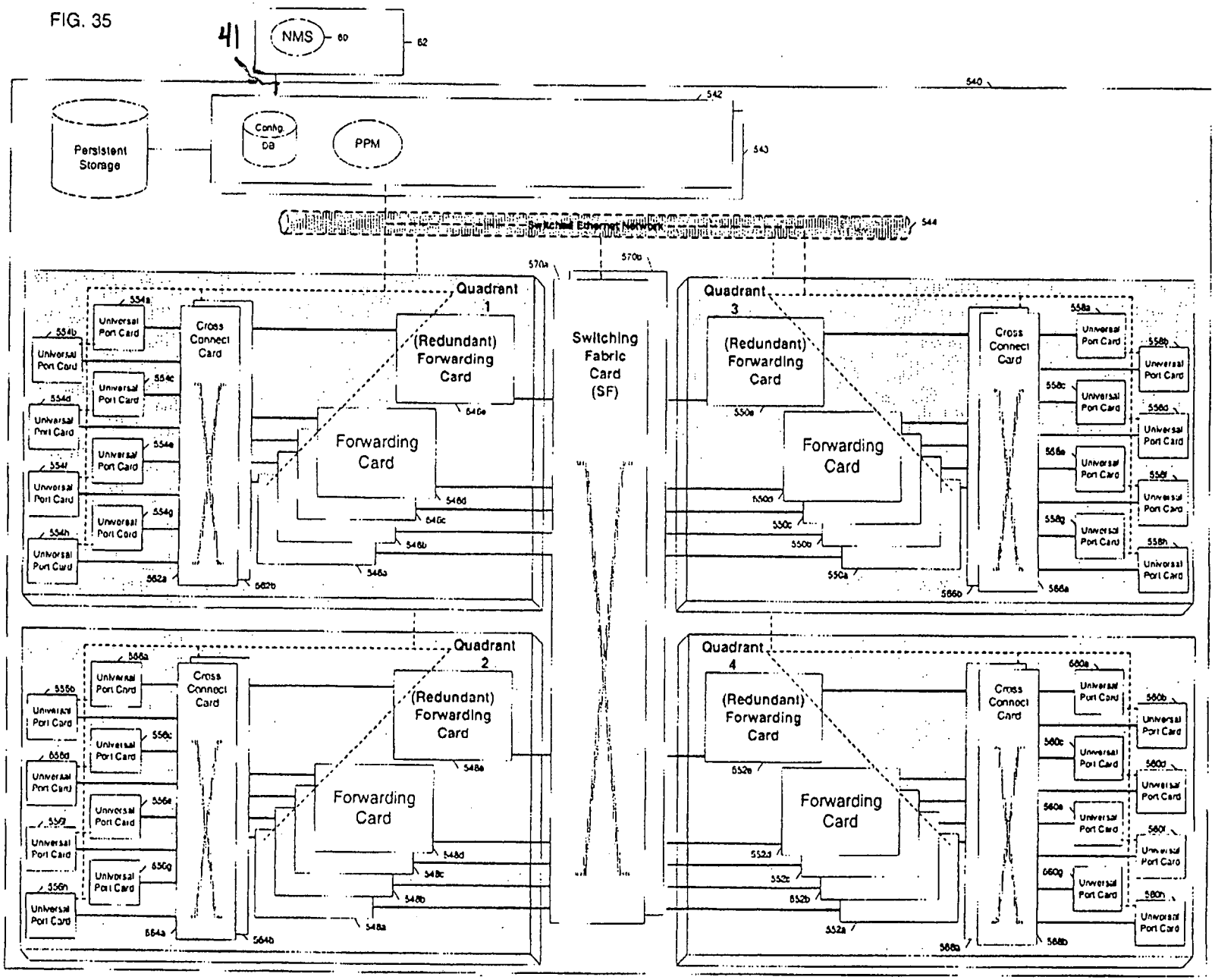
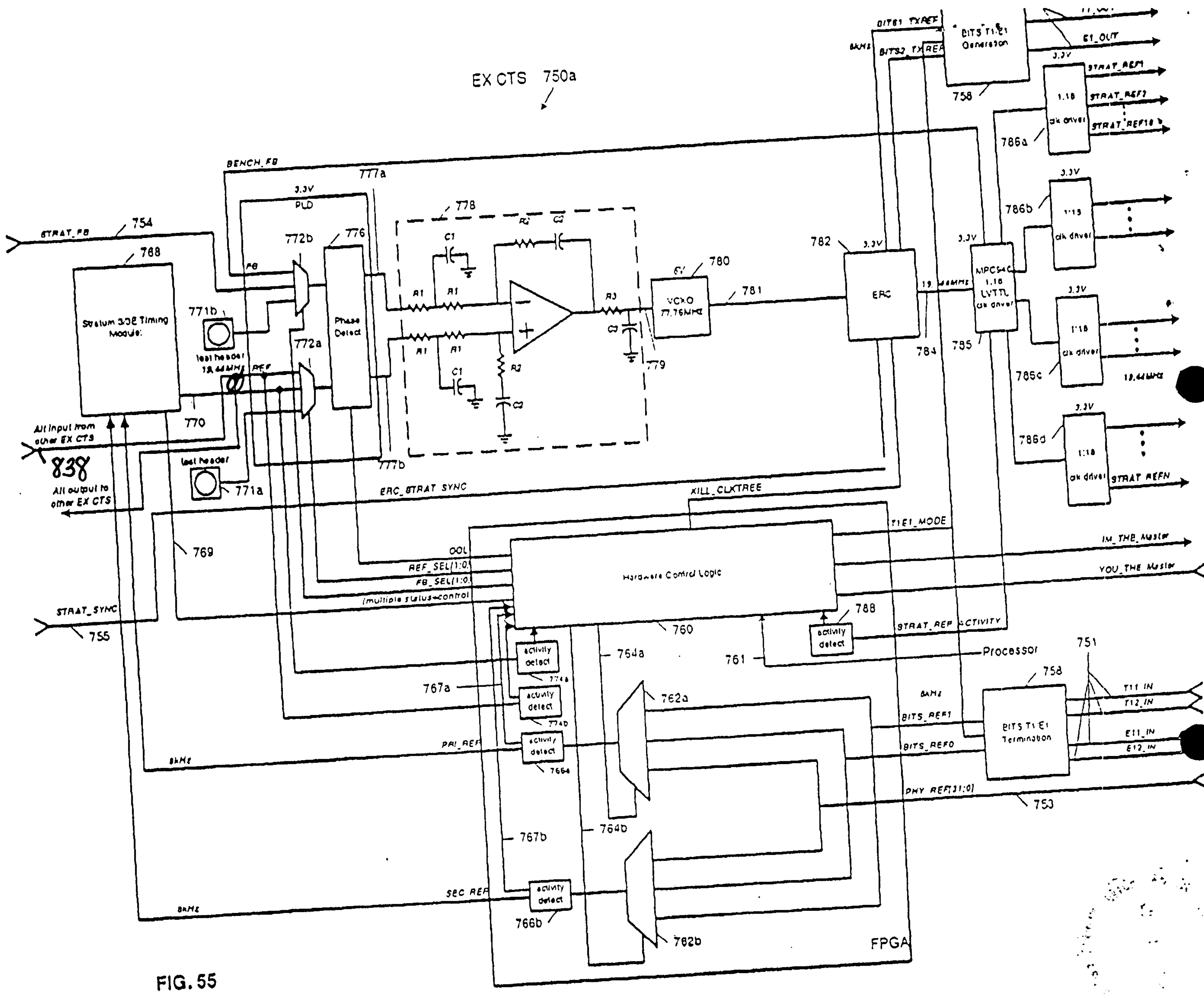

NMS
60
NMS DB
61
62
66
10
Processor
24
Config. DB
12
40
42
Config FP
429
DFP
430n
430a
Master Event Log
435
Master LE
431
Slave SRM
37a
Slave LE
433a
Local Event Log
435a
Master SRM
36
16a
Local Event Log
435b
Slave LE
433b
Slave SRM
37b
ATM
110
ATM
111
ATM
112
ATM
113
Port Driver
438a
Port Driver
438b
Port Driver
438c
Port Driver
438d
44A
44B
44C
44D
16n
433n
Slave LE
Slave SRM
37n
Local Event Log
435n
MPLS
432A
MPLS
432b
MPLS
432n
Port Driver
434c
Port Driver
434b
Port Driver
434n
68a
68b
68N

FIG. 35


41
NMS
60
62
540
542
Persistent Storage
Config. DB
PPM
543
Switched Ethernet Network
544
570a
570b
Quadrant 1
Quadrant 2
Quadrant 3
Quadrant 4
Universal Port Card
Cross Connect Card
(Redundant) Forwarding Card
Forwarding Card
Switching Fabric Card (SF)



EX CTS 750a
Stratum 3/3E Timing Module:
Phase Detect
VCXO 77.76MHz
ERC
MPC94C 1:18 LVTTL clk driver
1:18 clk driver
BITS T1:E1 Generation
BITS T1:E1 Termination
Hardware Control Logic
activity detect
FPGA
Processor
STRAT_FB
STRAT_SYNC
BENCH_FB
ERC_STRAT_SYNC
KILL_CLKTREE
T1E1_MODE
IM_THE_Master
YOU_THE_Master
STRAT_REF_ACTIVITY
OOL
REF_SEL[1:0]
FB_SEL[1:0]
(multiple status+control)
PRI_REF
SEC_REF
BITS_REF1
BITS_REF0
PHY_REF[31:0]
BITS1_TXREF
BITS2_TXREF
E1_OUT
STRAT_REF1
STRAT_REF2
STRAT_REF18
STRAT_REFN
T11_IN
T12_IN
E11_IN
E12_IN
All input from other EX CTS
All output to other EX CTS
test header
19.44MHz
8kHz
3.3V
PLD
754
755
758
751
753
760
761
762a
762b
764a
764b
766b
767a
767b
769
770
771a
771b
772a
772b
776
777a
777b
778
779
780
781
782
784
785
786a
786b
786c
786d
788
838

FIG. 55